WHAT IS CLAIMED IS:

1) An apparatus for heat exchange comprising:

a micro channel comprising a wall portion; and

a gas comprising a constituent particle;

wherein the micro channel is configured to accommodate a flow of the gas in a first direction substantially perpendicular to a cross section of the micro channel; and

wherein the wall portion and the constituent particle are configured such that collisions between the constituent particle and the wall portion are substantially specular; and

wherein the wall portion comprises at least a first wall portion, a second wall portion, a third wall portion, a first intermediate wall portion, and a second intermediate wall portion;

wherein a boundary of the first wall portion is contiguous with a first boundary of the first intermediate wall portion, a first boundary of the second wall portion is contiguous with a second boundary of the first intermediate wall portion, a second boundary of the second wall portion is contiguous with a first boundary of the second intermediate wall portion, and a boundary of the third wall portion is contiguous with a second boundary of the second intermediate wall portion, such that the first wall portion, the first intermediate wall portion, the second wall portion, the second intermediate wall portion, and the third wall portion form a contiguous portion of the wall of the micro channel;

wherein a first normal to the first wall portion is not parallel to a second normal to the second wall portion, and is also not parallel to a third normal to the third wall portion, and where the second normal is also not parallel to the third normal;

wherein an angle offset between the first normal and the second normal is less than 90 degrees, and is approximately the same as an angle offset between the second normal and the third normal;

wherein a separation between the first wall portion and the second wall portion is at least an integer N times a largest width of the micro channel over that separation; and

wherein the angle offset between the first normal and the second normal is less than M degrees where M equals N/10.

2) The apparatus of claim 1) wherein N is selected from at least one of: twenty-five and fifty.

3) The apparatus of claim 1) wherein the gas comprises air.

4) The apparatus of claim 1) wherein the micro channel is substantially confined to a planar region.

5) The apparatus of claim 1) wherein a path of the micro channel is a spiral with an inner portion and an outer portion, wherein a radius if the outer portion is greater than a radius of the inner portion.

6) The apparatus of claim 1), wherein at least a portion of the micro channel is configured with an internal surface area between approximately 3e-11 m^2 per linear micron to 6e-10 m^2 per linear micron.

7) The apparatus of claim 1) wherein the wall portion further comprises a coating material deposited on a substrate.

8) The apparatus of claim 7) wherein the substrate comprises copper.

9) The apparatus of claim 7) wherein the coating material comprises tungsten.

10) The apparatus of claim 1) wherein the wall portion is manufactured to be generally smooth.

11) A method for heat exchange, comprising:

providing a micro channel comprising a wall portion;

providing a gas comprising a constituent particle; and

inducing a flow of the gas adjacent to the wall portion;

wherein the micro channel is configured to accommodate the flow of the gas in a first direction substantially perpendicular to a cross section of the micro channel; and

wherein the wall portion and the constituent particle are configured such that collisions between the constituent particle and the wall portion are substantially specular; and

wherein the wall portion comprises at least a first wall portion, a second wall portion, a third wall portion, a first intermediate wall portion, and a second intermediate wall portion;

wherein a boundary of the first wall portion is contiguous with a first boundary of the first intermediate wall portion, a first boundary of the second wall portion is contiguous with a second boundary of the first intermediate wall portion, a second boundary of the second wall portion is contiguous with a first boundary of the second intermediate wall portion,

and a boundary of the third wall portion is contiguous with a second boundary of the second intermediate wall portion, such that the first wall portion, the first intermediate wall portion, the second wall portion, the second intermediate wall portion, and the third wall portion form a contiguous portion of the wall of the micro channel;

wherein a first normal to the first wall portion is not parallel to a second normal to the second wall portion, and is also not parallel to a third normal to the third wall portion, and where the second normal is also not parallel to the third normal;

wherein an angle offset between the first normal and the second normal is less than 90 degrees, and is approximately the same as an angle offset between the second normal and the third normal;

wherein a separation between the first wall portion and the second wall portion is at least an integer N times a largest width of the micro channel over that separation; and

wherein the angle offset between the first normal and the second normal is less than M degrees where M equals N/10.

12) The method of claim 11) wherein N is selected from at least one of: twenty-five and fifty.

13) The method of claim 11) wherein:

the step of providing a micro channel comprising a wall portion comprises:

providing the wall portion at a first temperature at a first time; and wherein

a portion of the fluid flows through the micro channel during a period of time between the first time and a second time later than the first time; and wherein

the wall portion exhibits a second temperature that is less than the first temperature at the second time.

14) The method of claim 11) wherein the gas comprises air.

15) The method of claim 11) wherein a path of the micro channel is a spiral with an inner portion and an outer portion, where a radius if the outer portion is greater than a radius of the inner portion.

16) The method of claim 11) further comprising, providing a heat exchange element conductively affixed to the wall portion.

17) The method of claim 11), wherein at least a portion of the micro channel is configured with an internal surface area between approximately 3e-11 m^2 per linear micron to 6e-10 m^2 per linear micron.

18) The method of claim 11) wherein providing a micro channel comprising a wall portion further comprises: depositing a material on a surface of the micro channel using at least one of: sputtering and evaporative deposition.

19) The method of claim 18) wherein the surface is copper.

20) The method of claim 18) wherein the material is tungsten.

21) The apparatus of claim 1) wherein the flow of gas in the micro channel is from the inner portion to the outer portion.

22) The apparatus of claim 1) wherein the flow of gas in the micro channel is from the outer portion to the inner portion.

23) A system for heat exchange comprising:

an accelerating element comprising the apparatus of claim 21);

a decelerating element comprising the apparatus of claim 22); and

an interface comprising a micro channel in fluid communication with the micro channel of the accelerating element and the micro channel of the decelerating element;

wherein the gas of the accelerating element comprises a first portion of the gas at substantially a first pressure and the gas of the decelerating element comprises a second portion of the gas at substantially a second pressure that is less than the first pressure.

24) The system of claim 23), wherein the accelerating element and the decelerating element are configured to transfer heat energy from the accelerating element to the decelerating element at a rate of at least 100 watts.

25) The system of claim 23), wherein each of the accelerating element and the decelerating element are approximately 100 millimeters by 100 millimeters.

WHAT IS CLAIMED IS:

1) An apparatus for heat exchange comprising:

a micro channel comprising a wall portion; and

a gas comprising a constituent particle;

wherein the micro channel is configured to accommodate a flow of the gas in a first direction substantially perpendicular to a cross section of the micro channel and wherein said gas does not condense to a liquid throughout said flow;

wherein the wall portion and the constituent particle are configured such that collisions between the constituent particle and the wall portion are substantially specular; and

wherein the wall portion comprises at least a first wall portion, a second wall portion, a third wall portion, a first intermediate wall portion, and a second intermediate wall portion;

wherein a boundary of the first wall portion is contiguous with a first boundary of the first intermediate wall portion, a first boundary of the second wall portion is contiguous with a second boundary of the first intermediate wall portion, a second boundary of the second wall portion is contiguous with a first boundary of the second intermediate wall portion, and a boundary of the third wall portion is contiguous with a second boundary of the second intermediate wall portion, such that the first wall portion, the first intermediate wall portion, the second wall portion, the second intermediate wall portion, and the third wall portion form a contiguous portion of the wall of the micro channel;

wherein a first normal to the first wall portion is not parallel to a second normal to the second wall portion, and is also not parallel to a third normal to the third wall portion, and where the second normal is also not parallel to the third normal;

wherein an angle offset between the first normal and the second normal is less than 90 degrees, and is approximately the same as an angle offset between the second normal and the third normal;

wherein the largest width of the micro channel is 180 microns;

wherein a separation between the first wall portion and the second wall portion is at least an integer N times the largest width of the micro channel over that separation; and

wherein the angle offset between the first normal and the second normal is less than M degrees where M equals N/10.

2) The apparatus of claim 1 wherein N is selected from at least one of: twenty-five and fifty.

3) The apparatus of claim 1 wherein the gas comprises air.

4) The apparatus of claim 1 wherein the micro channel is substantially confined to a planar region.

5) The apparatus of claim 1 wherein a path of the micro channel is a spiral with an inner portion and an outer portion, wherein a radius if the outer portion is greater than a radius of the inner portion.

6) The apparatus of claim 1, wherein at least a portion of the micro channel is configured with an internal surface area between approximately 3e-11 m^2 per linear micron to 6e-10 m^2 per linear micron.

7) The apparatus of claim 1 wherein the wall portion further comprises a coating material deposited on a substrate.

8) The apparatus of claim 7 wherein the substrate comprises copper.

9) The apparatus of claim 7 wherein the coating material comprises tungsten.

10) The apparatus of claim 1 wherein the wall portion is manufactured to be generally smooth.

11) A method for heat exchange, comprising:

providing a micro channel comprising a wall portion;

providing a gas comprising a constituent particle; and

inducing a flow of the gas adjacent to the wall portion;

wherein the micro channel is configured to accommodate the flow of the gas in a first direction substantially perpendicular to a cross section of the micro channel and wherein said gas does not condense to a liquid throughout said flow;

wherein the wall portion and the constituent particle are configured such that collisions between the constituent particle and the wall portion are substantially specular; and

wherein the wall portion comprises at least a first wall portion, a second wall portion, a third wall portion, a first intermediate wall portion, and a second intermediate wall portion;

wherein a boundary of the first wall portion is contiguous with a first boundary of the first intermediate wall portion, a first boundary of the second wall portion is contiguous with a second boundary of the first intermediate wall portion, a second boundary of the second wall portion is contiguous with a first boundary of the second intermediate wall portion, and a boundary of the third wall portion is contiguous with a second boundary of the second intermediate wall portion, such that the first wall portion, the first intermediate wall portion, the second wall portion, the second intermediate wall portion, and the third wall portion form a contiguous portion of the wall of the micro channel;

wherein a first normal to the first wall portion is not parallel to a second normal to the second wall portion, and is also not parallel to a third normal to the third wall portion, and where the second normal is also not parallel to the third normal;

wherein an angle offset between the first normal and the second normal is less than 90 degrees, and is approximately the same as an angle offset between the second normal and the third normal;

wherein a largest width of the micro channel is 180 microns;

wherein a separation between the first wall portion and the second wall portion is at least an integer N times the largest width of the micro channel over that separation; and

wherein the angle offset between the first normal and the second normal is less than M degrees where M equals N/10.

12) The method of claim 11 wherein N is selected from at least one of: twenty-five and fifty.

13) The method of claim 11 wherein:

the step of providing a micro channel comprising a wall portion comprises:

providing the wall portion at a first temperature at a first time; and wherein

a portion of the fluid flows through the micro channel during a period of time between the first time and a second time later than the first time; and wherein

the wall portion exhibits a second temperature that is less than the first temperature at the second time.

14) The method of claim 11 wherein the gas comprises air.

15) The method of claim 11 wherein a path of the micro channel is a spiral with an inner portion and an outer portion, where a radius if the outer portion is greater than a radius of the inner portion.

16) The method of claim 11 further comprising, providing a heat exchange element conductively affixed to the wall portion.

17) The method of claim 11, wherein at least a portion of the micro channel is configured with an internal surface area between approximately 3e-11 m^2 per linear micron to 6e-10 m^2 per linear micron.

18) The method of claim 11 wherein providing a micro channel comprising a wall portion further comprises: depositing a material on a surface of the micro channel using at least one of: sputtering and evaporative deposition.

19) The method of claim 18 wherein the surface is copper.

20) The method of claim 18 wherein the material is tungsten.

21) The apparatus of claim 1 wherein the flow of gas in the micro channel is from the inner portion to the outer portion.

22) The apparatus of claim 1 wherein the flow of gas in the micro channel is from the outer portion to the inner portion.

23) A system for heat exchange comprising:

an accelerating element comprising the apparatus of claim 21;

a decelerating element comprising the apparatus of claim 22; and

an interface comprising a micro channel in fluid communication with the micro channel of the accelerating element and the micro channel of the decelerating element;

wherein the gas of the accelerating element comprises a first portion of the gas at substantially a first pressure and the gas of the decelerating element comprises a second portion of the gas at substantially a second pressure that is less than the first pressure.

24) The system of claim 23, wherein the accelerating element and the decelerating element are configured to transfer heat energy from the accelerating element to the decelerating element at a rate of at least 100 watts.

25) The system of claim 23, wherein each of the accelerating element and the decelerating element are approximately 100 millimeters by 100 millimeters.